Top four list: why embryonic stem cells are critical

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Yesterday CIRM grantee Bruce Conklin gave his top four reasons why embryonic stem cells are so valuable and why federal funding for the work needs to be able to continue. Conklin, who is Senior Investigator Gladstone Institute of Cardiovascular Disease and professor at UCSF, studies heart rhythm defects by creating iPS cells from people genetically predisposed to have those defects, then maturing those into heart cells in a dish. This gives him a way of studying the rhythm defect in the lab, and allows him to test drugs that might correct the arrhythmia. (You can see his New Cell Lines Award research summary here.)

Conklin says he'd never be able to carry out his iPS work without advances made with embryonic stem cells. Here's his list:

1) Scientists have genetically engineered embryonic stem cells that are widely used for studying specific processes in the lab. "Obviously, we can remake those cells lines using iPS cells but it's a huge waste of time," he said. Instead of making progress toward developing new therapies or finding new drugs, labs would have to spend years redoing work they've already done.

2) Embryonic stem cells are farther along clinically than iPS cells or the new directly reprogrammed cells. "The first clinical trials of pluripotent cells will be embryonic stem cells. Ten years from now we'll probably see a mix of embryonic and iPS cells," he predicted. Adult cells are good for many things, he said, but aren't as flexible as pluripotent embryonic or iPS cells.

3) Embryonic stem cells reproduce the steps taken by nature. "The idea is that nature knows something we don't, because we don't know very much," Conklin said. Studying embryonic stem cells as they go down the path toward a specific cell type, like a skin cell or a neuron or a pancreatic islet cell, can give us clues about what might be going wrong in diseases afflicting those cell types.

4) Some diseases seem to begin at the earliest stages of development. "If we are going to understand human development we have to know how the process happens naturally," he said. Only by studying embryonic stem cells can we understand genetic diseases that strike at the earliest stage, or what's called epigenetic changes that can alter the way genes function.

Conklin seemed optimistic about the future of iPS and direct reprogramming, but pointed out that even Jamie Thomson, who was part of one of the two teams that first created iPS cells, has predicted that iPS cell research would be five years ahead of where it is now if embryonic stem cell research weren't slowed under the Bush funding regulations.

The CIRM Governing Board recently passed a resolution that "strongly encourages federal policy that supports all forms of stem cell research for the millions of Americans who suffer from disease and injury and strongly supports criminalizing human reproductive cloning." You can read Resolution 2010-01 here, which supports both the DeGette and Spector legislation "or any successor legislation that embodies the policies advanced in President Obama's Executive Order 13505 and the National Institutes of Health July 7, 2009 guidelines on hESC research."

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Tags: Conklin, Gladstone Institute, University of California San Francisco

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